JUN 0 7 2013

SECTION 8
510(k) SUMMARY

This summary of 510(k) safety and effectiveness information is being submitted in accordance with the requirements of SMDA 1990 and 21 CFR 807.92. The assigned 510(k) number is K131217.

807.92 (a)(1): Name: Hitachi Chemical Diagnostics
Address: 630 Clyde Court
Mountain View, CA 94043

Phone: (650) 961 5501
FAX: (650) 969 2745
Contact: Mr. Charles Tsou

Regulatory Correspondent: Erika Ammirati

807.92 (a)(2): Device name- trade name and common name, and classification

Trade name:
S TEST Reagent Cartridge Total Bilirubin (T-BIL)

Common Name: Routine chemistry analyzer for total bilirubin

Classifications: Class II, 21 CFR § 862.1110- Bilirubin (total and direct), Product Code CIG

807.92 (a)(3): Identification of the legally marketed predicate devices
Cobas c systems Total Bilirubin (BILTS) (Roche Diagnostics, Inc., Indianapolis, IN) - K100853

807.92 (a)(4): Device Description
The Hitachi Clinical Analyzer is an automatic, bench-top, wet chemistry system intended for use in clinical laboratories or physician office laboratories. The instrument consists of a desktop analyzer unit, an operations screen that prompts the user for operation input and displays data, a printer, and a unit cover. The analyzer unit includes a single probe, an incubation rotor, carousels for sample cups and reagent cartridges, and a multi-wavelength photometer. The single-use reagent cartridges may be placed in any configuration on the carousel, allowing the user to develop any test panel where the reagent cartridges are available.

The S TEST reagent cartridges are made of plastic and include two small reservoirs capable of holding two separate reagents (R1 and R2), separated by a reaction cell/photometric cuvette. The cartridges also include a dot code label that contains all chemistry parameters, calibration factors, and other production-related information, e.g., expiration dating. The dimensions of the reagent cartridges are: 13.5 mm (W) × 28 mm (D) × 20.2 mm (H).

System operation: After the sample cup is placed into the carousel, the analyzer pipettes the sample, pipettes the reagent, and mixes (stirs) the sample and reagent together. After the sample and reagent react in the incubator bath, the analyzer measures the absorbance of the sample, and based on the absorbance of the reactions, it calculates the concentration of analyte in the sample. The test system can measure analytes in serum or plasma and results are available in approximately 15 minutes per test. This submission is for Reagent Cartridge Total Bilirubin.

Chemistry reaction: Nitrous acid method: Total bilirubin in samples is oxidized to biliverdin by the action of nitrous acid at pH 3.7. The concentration of total bilirubin can be determined by measuring the decrease of absorbance at a wavelength of 450nm .

807.92 (a)(5): Intended Use

The S TEST Reagent Cartridge Total Bilirubin (T-BIL) is intended for the quantitative determination of total bilirubin in serum, lithium heparinized plasma, EDTA plasma, and sodium citrate plasma using the HITACHI Clinical Analyzer E40. The S TEST Reagent Cartridge Total Bilirubin is intended for use in clinical laboratories or physician office laboratories. For in vitro diagnostic use only.

Total bilirubin measurements are used in the diagnosis and treatment of disorders of the liver.

Hitachi Chemical Diagnostics, Inc.
630 Clyde Court, Mountain View, CA 94043-2239 Tel: 800 233 6278 Fax: 650 969 2745
www.hcdiagnostics.com

807.92 (a)(6): Technological Similarities and Differences to the Predicate

The following chart describes similarities and differences between the two total bilirubin test systems.

Characteristic	Hitachi S TEST Systems	PREDICATE
Instrument Platform	Hitachi Clinical Analyzer (originally cleared under K111753)	Roche cobas c systems – K100853
Total Bilirubin	K number- K131217	Roche K number- K100853
Device Class, Regulation Code	Class II, 21 CFR 862.1110	Same
Classification Product Code	CIG	Same
Intended Use	Quantitative determination of T-BIL	Same
Testing Environment	Physician office or clinical lab	Clinical lab
Test Principle	Nitrous acid method: Total bilirubin in samples is oxidized to biliverdin by the action of nitrous acid at pH 3.7. The concentration of total bilirubin can be determined by measuring the decrease of absorbance at a wavelength of 450nm .	Diazo method: Total bilirubin, in the presence of solubilizing agent, is coupled with a diazonium ion in a strongly acidic medium. The intensity of the color of the azobilirubin produced in proportional to the total bilirubin concentration and can be measured photometrically.
Specimen Type	Human serum or plasma	Same
Reportable Range	0.4 to 40.0 mg/dL	0.1 to 35.1 mg/dL
Detection Wavelength	450/546 nm	546/600 nm
Detection Limit	0.2 mg/dL	0.1 mg/dL
Linearity	0.2 to 40.0 mg/dL	0.1 to 35.1 mg/dL
Precision	%CVs range from 2.4% to 8.8%	%CVs range from 0.9% to 4.6% (from product labeling)

Hitachi Chemical Diagnostics, Inc.
630 Clyde Court, Mountain View, CA 94043-2239 Tel: 800 233 6278 Fax: 650 969 2745
www.hcdiagnostics.com

807.92 (b)(1): Brief Description of Nonclinical Data

A series of studies were performed that evaluated the following nonclinical performance characteristics for each analyte: analytical sensitivity (limits of detection), linearity, 20-day in-house precision, interference testing, in-house method comparisons, and matrices comparison between serum and various plasma types.

Analytical Sensitivity (Limits of Detection)

The study followed CLSI EP17-A with the following results: limit of blank = 0.1 mg/dL; limit of detection = 0.2 mg/dL; the limit of quantitation (LoQ) study evaluated three low level specimens in six runs over three with three instruments; the LoQ was found to be 0.4 mg/dL with ±20%CV.

Linearity- T-BIL

The study followed CLSI EP-6A where 15 serial dilution, plus the zero standard, were assayed in triplicate and the results were averaged. The data showed the following linear regression equation was y = 1.0136x -0.0492; r^2=0.9998. The range of linearity was 0.1 to 42.1 mg/dL. The reportable range is 0.4 to 40.0 mg/dL.

20-day In-house Precision- T-BIL

The studies followed CLSI EP5-A2, where four levels of samples were each tested in two runs, twice a day, for 20 days with one lot of reagents and one analyzer. The results were as follows:

Precision Summaries:

Total Bilirubin- Low, Level 1, Summary

Total Bilirubin	Within-Run	Total
Mean (mg/dL)	0.68	0.68
SD (mg/dL)	0.04	0.06
%CV	5.8%	8.8%

Total Bilirubin - Middle, Level 2, Summary

Total Bilirubin	Within-Run	Total
Mean (mg/dL)	3.19	3.19
SD (mg/dL)	0.04	0.13
%CV	1.3%	4.1%

Total Bilirubin - High, Level 3, Summary

Total Bilirubin	Within-Run	Total
Mean (mg/dL)	7.47	7.47
SD (mg/dL)	0.08	0.23
%CV	1.1%	3.1%

Hitachi Chemical Diagnostics, Inc.
830 Clyde Court, Mountain View, CA 94043-2239 Tel: 800 233 6278 Fax: 650 969 2745
www.hcdiagnostics.com

Total Bilirubin – Very High, Level 4, Summary

Total Bilirubin	Within-Run	Total
Mean (mg/dL)	27.29	27.29
SD (mg/dL)	0.27	0.65
%CV	1.0%	2.4%

Interference Testing (per CLSI EP7-A2)
The interference study for ascorbic acid and hemoglobin included two pools (approx. 1 and 4 mg/dL total bilirubin) where increasing levels of interferents were spiked into the pools. The spiked samples were tested in triplicate, and the mean results were compared to the neat samples. (no interferent). Lack of interference was defined as recoveries between 90% and 110% (or 0.1 mg/dL) of the neat value, and the data demonstrated that the total bilirubin test system was not affected by high levels of the following substances at the levels noted:

Ascorbic acid: no interference up to 50 mg/dL
Hemoglobin: no interference up to 1,000 mg/dL

The effect from lipids was evaluated in a different experiment. In this study, three sets of serum samples with differing levels of natural triglyceride (TG, neat) and similar levels of total bilirubin (TBIL, low, middle, and high) were tested, along with three sets of serum samples with low TG and similar levels of total bilirubin. Patient specimens with TG ranging from 530 mg/dL to 580 mg/dL were matched with similar total bilirubin concentrations, but with lower (less than 100 mg/dL) TG levels.

The samples were tested with S TEST TBIL and TG on the Hitachi Clinical Analyzer E40 on all dilutions in triplicate. TBIL target levels on the intermediate were calculated using the means values of the highest and lowest dilutions and the dilution ratios. The recovery at all levels was calculated.

The data demonstrated no interference with up to 580 mg/dL triglycerides for total bilirubin.

Other interferences from medications or endogenous substances may affect results and the sponsor refers user to the literature for more information in the labeling. Literature cited:
Young, D.S. *Effects of Preanalytical Variables on Clinical Laboratory Tests*, 2nd ed. Washington DC: AACC Press; 1997:3-85

Method Comparison
A total of 92 clinical specimens spanning the dynamic range (0.4 to 36.6 mg/dL), were assayed in singleton and in a blinded fashion by both the Hitachi E40 system and a standard laboratory system. The comparative data were analyzed by linear regression and are shown below. (CI = confidence interval)

Hitachi Chemical Diagnostics, Inc.
630 Clyde Court, Mountain View, CA 94043-2239 Tel: 800 233 6278 Fax: 650 969 2745
www.hcdiagnostics.com

Regression Statistics:

n	r	Slope (95% CI)	y-intercept (95% CI)	X mean	Y mean
92	0.994	0.94 (0.92 to 0.96)	0.40 (0.23 to 0.57)	3.5 mg/dL	3.7 mg/dL

Matrices Comparisons
A study was performed to validate the use of three plasma types as an alternative to serum for the Hitachi Clinical Analyzer with S TEST Reagent Cartridge Total Bilirubin. The plasma types were sodium citrate, EDTA, and lithium heparin. Thirty-nine (39) matched serum/plasma samples that spanned the dynamic range (0.4 to 37.0 mg/dL, serum) were assayed in singleton and the results were compared using linear regression (plasma = y-axis, each type). The performance characteristics were as follows.

N = 39
Range (serum) = 0.4 to 37.0 mg/dL total bilirubin

	Heparinized Plasma	K3 EDTA Plasma	Na Citrate Plasma
Slope (95% CIs)	1.00 (0.99 to 1.02)	1.02 (1.01 to 1.03)	1.01 (1.00 to 1.02)
y-intercept (95% CIs)	0.07 (-0.11 to 0.25)	0.02 (-0.09 to 0.14)	0.02 (-0.12 to 0.16)
r	0.999	0.999	0.999

Expected values/Reference range:
The expected values as stated within the labeling are based on the literature. The manufacturer recommends each laboratory determine the expected values for its particular population.

Reference range: 0.3 – 1.2 mg/dL[1]
1. Tietz, Fundamentals of Clinical Chemistry, 4th Edition, WB Saunders Company, 1996.

807.92 (b)(2): Brief Description of Clinical Data
Studies for precision and method comparison (accuracy) were performed at three external POL-type sites to evaluate the Hitachi E40 Clinical Analyzer with S TEST Reagent Cartridge Total Bilirubin in one of its targeted intended use environments, the physician's office laboratory.

For the external site precision study, each site received three blinded serum samples (the Precision Panel, labeled A, B, and C) that were chosen to represent low, middle, and high concentrations of total bilirubin. Each sample was assayed six times per day for five days, reporting 30 results per level. Precision estimates for total precision were as follows:

Hitachi Chemical Diagnostics, Inc.
630 Clyde Court, Mountain View, CA 94043-2239 Tel: 800 233 6278 Fax: 650 969 2745
www.hcdiagnostics.com

Total Bilirubin (mg/dL)
n = 30 replicates per sample per site

Site	Sample	Mean	Within-run Precision		Total Precision	
			SD (mg/dL)	%CV	SD (mg/dL)	%CV
1	A	0.71	0.04	5.5	0.04	5.7
2	A	0.68	0.04	5.5	0.04	5.6
3	A	0.71	0.04	6.0	0.04	5.6
1	B	3.23	0.06	2.0	0.09	2.8
2	B	3.20	0.06	1.8	0.06	1.9
3	B	3.02	0.06	2.1	0.10	3.5
1	C	7.77	0.12	1.5	0.17	2.2
2	C	7.74	0.10	1.3	0.12	1.5
3	C	7.24	0.12	1.6	0.30	4.1

For the external method comparison studies, a series of approximately 50 serum specimens with total bilirubin values ranging from 0.4 to 38.1 mg/dL, were assayed on the Hitachi E40 Clinical Analyzer at three sites using S TEST Reagent Cartridge Total Bilirubin (y) and a comparative method as the reference method (x). Linear regression analyses (least squares) yielded the following results:

POL ACCURACY DATA SUMMARY- Total Bilirubin (mg/dL)

Site #	n	Range (mg/dL)	Regression Equation	"r"	SE (mg/dL)	CI* Slope	CI Intercept
1	50	0.4 to 37.1	y = 0.94x +0.36	0.995	0.95	0.91 to 0.96	0.04 to 0.69
2	48	0.4 to 38.1	y = 0.96x +0.22	0.988	1.52	0.92 to 1.00	-0.31 to 0.76
3	53	0.4 to 37.8	y = 0.91x +0.35	0.993	1.07	0.88 to 0.94	0.00 to 0.70

*95% Confidence Interval

807.92 (b)(3): Conclusions from Nonclinical and Clinical Testing
Nonclinical and clinical testing was performed for the Hitachi Clinical Analyzer E40 with Reagent Cartridge Total Bilirubin. The test system was shown to be safe and effective for its intended use.

Hitachi Chemical Diagnostics, Inc.
630 Clyde Court, Mountain View, CA 94043-2239 Tel: 800 233 6278 Fax: 650 969 2745
www.hcdiagnostics.com

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Food and Drug Administration
10903 New Hampshire Avenue
Document Control Center – WO66-G609
Silver Spring, MD 20993-0002

June 7, 2013

Hitachi Chemical Diagnostics Inc.
C/O Erika Ammirati
630 Clyde Court
MOUNTAIN VIEW CA 94043

Re: K131217
Trade/Device Name: S TEST Reagent Cartridge Total Bilirubin (T-BIL)
Regulation Number: 21 CFR 862.1100
Regulation Name: Bilirubin (total or direct) test system
Regulatory Class: II
Product Code: CIG
Dated: April 26, 2013
Received: April 30, 2013

Dear Ms. Ammirati:

We have reviewed your Section 510(k) premarket notification of intent to market the device referenced above and have determined the device is substantially equivalent (for the indications for use stated in the enclosure) to legally marketed predicate devices marketed in interstate commerce prior to May 28, 1976, the enactment date of the Medical Device Amendments, or to devices that have been reclassified in accordance with the provisions of the Federal Food, Drug, and Cosmetic Act (Act) that do not require approval of a premarket approval application (PMA). You may, therefore, market the device, subject to the general controls provisions of the Act. The general controls provisions of the Act include requirements for annual registration, listing of devices, good manufacturing practice, labeling, and prohibitions against misbranding and adulteration. Please note: CDRH does not evaluate information related to contract liability warranties. We remind you, however, that device labeling must be truthful and not misleading.

If your device is classified (see above) into either class II (Special Controls) or class III (PMA), it may be subject to additional controls. Existing major regulations affecting your device can be found in the Code of Federal Regulations, Title 21, Parts 800 to 898. In addition, FDA may publish further announcements concerning your device in the Federal Register.

Please be advised that FDA's issuance of a substantial equivalence determination does not mean that FDA has made a determination that your device complies with other requirements of the Act or any Federal statutes and regulations administered by other Federal agencies. You must comply with all the Act's requirements, including, but not limited to: registration and listing (21 CFR Part 807); labeling (21 CFR Part 801); medical device reporting (reporting of medical device-related adverse events) (21 CFR 803); good manufacturing practice requirements as set forth in the quality systems (QS) regulation (21 CFR Part 820); and if applicable, the electronic product radiation control provisions (Sections 531-542 of the Act); 21 CFR 1000-1050.

If you desire specific advice for your device on our labeling regulation (21 CFR Part 801), please go to http://www.fda.gov/AboutFDA/CentersOffices/CDRH/CDRHOffices/ucm115809.htm for

the Center for Devices and Radiological Health's (CDRH's) Office of Compliance. Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21CFR Part 807.97). For questions regarding the reporting of adverse events under the MDR regulation (21 CFR Part 803), please go to http://www.fda.gov/MedicalDevices/Safety/ReportaProblem/default.htm for the CDRH's Office of Surveillance and Biometrics/Division of Postmarket Surveillance.

You may obtain other general information on your responsibilities under the Act from the Division of Small Manufacturers, International and Consumer Assistance at its toll-free number (800) 638-2041 or (301) 796-7100 or at its Internet address http://www.fda.gov/MedicalDevices/ResourcesforYou/Industry/default.htm.

Sincerely yours,

Carol C. Benson -S for

Courtney H. Lias, Ph.D.
Director
Division of Chemistry and Toxicology Devices
Office of In Vitro Diagnostics
and Radiological Health
Center for Devices and Radiological Health

Enclosure

Indications for Use

510(k) Number (if Known): k131217

Device Name:
S TEST Reagent Cartridge Total Bilirubin (T-BIL)

Indications for Use:
The S TEST Reagent Cartridge Total Bilirubin (T-BIL) is intended for the quantitative determination of total bilirubin in serum, lithium heparin plasma, K3 EDTA plasma, and sodium citrate plasma using the Hitachi Clinical Analyzer E40. The S TEST Reagent Cartridge Total Bilirubin is intended for use in clinical laboratories or physician office laboratories. For *in vitro* diagnostic use only.

Total Bilirubin measurements are used in the diagnosis and treatment of disorders of the liver.

Prescription Use __X__ (Part 21 CFR 801 Subpart D) AND/OR Over-The-Counter Use _____ (21 CFR 807 Subpart C)

(PLEASE DO NOT WRITE BELOW THIS LINE-CONTINUE ON ANOTHER PAGE IF NEEDED)

Concurrence of CDRH, Office of In Vitro Diagnostics and Radiological Health (OIR)

Yung W. Chan -S

Division Sign-Off
Office of In Vitro Diagnostics and Radiological Health

510(k)_k131217